UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

UNITED STATES OF AMERICA, Plaintiff, V. SOLVENTS RECOVERY SERVICE OF NEW ENGLAND, INC., Defendant.	Civil Action No. H-79-704(JAC)

DECLARATION OF MATTHEW HOAGLAND

I, Matthew Hoagland, declare as follows:

I. PERSONAL BACKGROUND

A. Employment History

1. I am presently employed as a Remedial Project Manager/Environmental Scientist in the Connecticut Superfund Section of the United States Environmental Protection Agency (EPA) Region I in Boston, Massachusetts. I have held this position since January 1, 1989. Prior to joining the Connecticut Superfund Section, I was a Geologist in the Maine and Vermont Waste Regulation Section at EPA Region I. I held that position from the time I began my employment at EPA Region I on October 14, 1986, until January 1, 1989.

2. Before working for the EPA, I was employed as a Geologist with the Amoco Minerals Company in Englewood, Colorado (May to November, 1979); a Foreman at the General Dynamics Corporation in Groton, Connecticut (July, 1980 to January, 1985);

followed by a Research Assistant/Hydrogeologist with the Hydrogeology Research Group of Boston University (August, 1985 to September, 1986).

B. Education

3. I received my Bachelors Degree in Geological Sciences from the University of Maine in 1979. In 1988, I received a Masters Degree in Geology from Boston University.

C. Involvement with the SRSNE Facility

4. Since January of 1989, I have been EPA's Remedial Project Manager (RPM) for the National Priorities List (NPL) site located at Solvents Recovery Service of New England's (SRSNE) Southington, Connecticut facility. In the course of my work as RPM for this site, I have read the Consent Decree that was entered in February, 1983 between SRSNE, EPA and two intervenors. ("Consent Decree")(Exhibit 2). I understand the requirements imposed upon SRSNE by that Consent Decree with regard to the construction and operation of the on-site groundwater recovery system ("on-site system"). I have also reviewed a number of documents submitted by SRSNE in its efforts to comply with the Consent Decree requirements.

5. I have conducted site visits of the SRSNE facility in Southington, Connecticut on several occasions including February, 1989; December, 1989; January, 1990; and April, 1990. During all visits, I conducted visual inspections of the on-site system constructed by SRSNE.

6. I have also had discussions concerning the on-site system with SRSNE officials, employees, and consultants; EPA engineers and hydrologists; a U.S. Geological Survey hydrogeologist; and EPA contractor engineers and hydrogeologists.

II. EPA'S SUIT TO ADDRESS GROUNDWATER CONTAMINATION

7. From 1955 to 1967, at its Southington site, SRSNE operated several lagoons for the storage and disposal of still bottoms from SRSNE's distillation of spent solvents. These still bottoms included volatile organic compounds such as aliphatic and aromatic hydrocarbons, as well as solids from the paint, lacquer, varnish, and plastics industries, and ketones, esters, and alcohols. Answers of Defendant Solvents Recovery Service of New England to First Set of Interrogatories Submitted by Plaintiff United States of America dated September 23, 1981 ("Answers to Interrogatories") at 6-7 (Exhibit 3). There is no evidence to suggest that the lagoons in which such wastes were disposed or stored were lined with any sort of impermeable material.

8. One of these lagoons was used as a sludge pit for the disposal of the above-referenced still bottoms. This pit was approximately thirty feet wide, sixty feet long, and eight feet deep. After entering the sludge pit, the wastes would either: 1) seep into the ground, and into the underlying aquifer; 2) get trucked off-site; or 3) overflow into one or more of the other lagoons. These other lagoons, the purpose of which was to receive overflow from the sludge pit, were approximately five

feet long, ten feet wide, and one foot deep. Answers to Interrogatories at 6-7 (Exhibit 3); Site Map (Exhibit 4).

9. In the late 1970's, two Town of Southington drinking water production wells located near the SRSNE site were shut down due to the presence of elevated levels of volatile organic compounds. A report prepared for the EPA by Warzyn Engineering, Inc. linked SRSNE to the contamination of these two wells. Hydrogeologic Investigation EPA/JRB Associates Town of Southington, CT at 60 ("Warzyn Report")(Exhibit 5). In December, 1979, EPA filed suit against SRSNE in this Court under § 7003 of the Resource Conservation and Recovery Act, the "imminent hazard" provision, for the contamination of those wells as a result of SRSNE's disposal of hazardous waste at its site, and under the Clean Water Act for unpermitted discharges of pollutants into the Quinnipiac River. Complaint of United States v. SRSNE (Exhibit 6). In November, 1982, EPA amended its complaint to add claims under §§ 106 and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). First Amended Complaint of United States v. SRSNE (Exhibit 7).

III. OVERVIEW OF CONSENT DECREE

10. In December, 1982, prior to trial, EPA, SRSNE, and two intervening parties entered into the Consent Decree that EPA now seeks to enforce. That decree requires SRSNE to contain and abate contamination of soil, groundwater, and surface water by undertaking three major projects. These projects include: 1)

improvements to the SRSNE facility; 2) the construction and operation of an on-site system for the extraction and treatment of contaminated groundwater; and 3) the construction and operation of an off-site groundwater recovery and treatment system.

A. Facility Improvements

11. Under the Consent Decree, SRSNE was required to improve its waste handling facilities in order to prevent further migration of hazardous materials into the soil from ongoing facility operations, to provide adequate containment for spillage and leakage, and to control contamination from precipitation and surface run-off. Consent Decree at Par. 7 (Exhibit 2). These requirements were later incorporated into SRSNE's RCRA Permit, which EPA seeks to enforce in a separate proceeding.

B. On-Site System

12. Secondly, SRSNE was required by the Consent Decree to construct an on-site multi-point shallow well system designed to recover and treat contaminated groundwater so as to prevent the off-site migration of subsurface contaminants. Consent Decree at Par. 8(A) (Exhibit 2). This system is referred to in this Declaration as the "on-site" system.

13. The Consent Decree also requires the implementation of a two-part performance monitoring system for the on-site system. The purpose of the performance monitoring system is to determine the effectiveness of the on-site system both in preventing the

flow of contaminated groundwater from the facility and in removing contaminants from the captured groundwater.

14. The first part of the performance monitoring system is known as hydraulic verification. Consent Decree at Par. 8 (Exhibit 2). The purpose of hydraulic verification is to verify that groundwater at the eastern and southern boundaries of the facility is flowing toward the recovery wells and not off-site.

15. The second part of the performance monitoring system is known as the chemical monitoring and testing program. Consent Decree at Par. 10 (Exhibit 2). The purpose of chemical monitoring is to evaluate improvements in the quality of the groundwater as the groundwater remediation system operates.

C. Off-Site System

16. Lastly, the Consent Decree requires SRSNE to construct an off-site groundwater intercept system to contain the southerly migration of contaminants beyond the cone of influence of the on-site system. The off-site system, like the on-site system, also requires a hydraulic performance verification system. Consent Decree at Par. 12 (Exhibit 2). The off-site system, although constructed by SRSNE, has not yet begun operation, due to the lack of a required permit under the Clean Water Act.

IV. ON-SITE SYSTEM REQUIREMENTS

17. The Consent Decree requires SRSNE to construct an on-site system meeting the following objectives and specifications:

> SRSNE shall abate and contain groundwater pollution at and in the immediate vicinity of the SRSNE facility by

> undertaking and implementing a multi-point shallow well system. This system shall be constructed as close as possible to the eastern and part of the southern property boundaries of the SRSNE facility and shall be designed to prevent the off-site migration of subsurface contaminants and, consistent therewith, to extend its influence to the maximum practicable extent to off-site contamination.

Consent Decree at Par. 8(A) (Exhibit 2).

18. Within 12 months of EPA approval of SRSNE's design plans for the system, SRSNE was required to commence operation of that system in accordance with such plans. Consent Decree at Par. 8(C) (Exhibit 2).

19. The Consent Decree requires SRSNE to continuously operate the approved on-site system in accordance with the EPA-approved design operating criteria. Consent Decree at Par. 8(D) (Exhibit 2).

20. SRSNE is required to submit, according to a specified schedule, reports on groundwater flow patterns in the vicinity of the recovery wells in order to demonstrate that the on-site system is meeting or exceeding its projected cone of influence[1] as approved by EPA pursuant to paragraph 8(B) of the Consent Decree. Consent Decree at Par. 8(E) (Exhibit 2).

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[1] The term cone of influence is defined in Paragraph 8(B) of the CD as follows:

> ...the potentiometric surface around the pumping groundwater recovery system such that the hydraulic gradient is in the direction of the pumping wells.

With regard to the aquifer underlying the SRSNE site, the potentiometric surface is equivalent to the surface of the water table. The hydraulic gradient is the slope of the water table surface.

21. The Consent Decree requires SRSNE to take specified steps in the event that the on-site system's projected cone of influence is not being met. Consent Decree at Pars. 8(F) and 8(G) (Exhibit 2).

22. Paragraph 8(F) states the following:

> In the event the cone of influence maintained by the operation of the groundwater recovery system fails to meet the projected influence of the system approved by EPA pursuant to paragraph 8(B) hereof, SRSNE shall take immediate steps to modify pump rates, controls, or make such other modifications as shall be necessary to re-establish the projected influence.

23. Paragraph 8(G) states the following:

> In the event the cone of influence maintained by the operation of the groundwater recovery system cannot meet the projected influence of the system approved by EPA pursuant to paragraph 8(B) hereof, due to design or construction deficiencies, SRSNE shall promptly submit to EPA for approval such modified engineering design specifications as shall be necessary to meet the projected influence and shall promptly upon EPA approval undertake all modifications necessary to establish the projected influence.

24. Paragraph 8(F) thus stipulates that, if the system is constructed according to its approved design and it fails to meet the objective of preventing the migration of contaminated groundwater from the facility, and corrections can be made within the bounds of the approved design, then SRSNE is required to make such corrections so as to meet the objective. EPA approval for such action is not required.

25. Paragraph 8(G) applies when contaminated groundwater is not being contained within the facility boundaries because, although the system was constructed according to the approved design, the design is flawed, or because the system is not

constructed according to the approved design. In such an event, Paragraph 8(G) requires SRSNE to promptly submit to EPA new design specifications that will achieve the groundwater containment objective.

26. Paragraph 10 of the Consent Decree sets out the requirements for the establishment and operation of a program to monitor and report on the improvements in groundwater quality resulting from the operation of the on-site system. Paragraph 10(A) requires the establishment and implementation of such a program. Paragraph 10(B) stipulates that the points from which samples should be taken shall consist of the common header[2] of the on-site system and three additional monitoring wells. Paragraph 10(C) requires SRSNE to sample at these points for specified parameters using a particular method of analysis, and to report the results of such analyses according to a specified schedule.

V. APPROVED REQUIREMENTS

27. On December 16, 1983, EPA conditionally approved SRSNE's engineering design for the on-site system entitled "Engineering Report for Multi-Point Shallow Well Groundwater Recovery and Treatment System, Monitoring and Sampling Program, and Preliminary Connecticut DEP Permit Application" ("1983

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[2]The "common header" is the pipe which receives well water from the pipes connected to all of the groundwater recovery wells.

Engineering Report")(Exhibit 8); Letter of December 16, 1983 from EPA to SRSNE ("December 16, 1983 Moebes Letter")(Exhibit 9).

28. On December 20, 1984, EPA approved SRSNE's Final Design Plans and Specifications for the on-site system. Final Design Plans and Specifications for Multi-Point Shallow Well Groundwater Recovery System ("1984 Final Design Plans")(Exhibit 10); Letter of December 20, 1984 from EPA to SRSNE ("December 20, 1984 Moebes letter")(Exhibit 11). The 1984 Final Design Plans were revised from an earlier version submitted by SRSNE as Appendix B to the 1983 Engineering Report.

29. According to the 1983 Engineering Report and 1984 Final Design Plans, the on-site system would consist of twenty-five groundwater recovery wells located along the southern and eastern boundaries of the SRSNE site. These wells were designed to pump contaminated groundwater to a treatment facility, where contaminants would be removed. The treated groundwater would then be discharged into the Quinnipiac River pursuant to SRSNE's permit under the Clean Water Act. 1983 Engineering Report (Exhibit 8); 1984 Final Design Plans (Exhibit 10).

30. As stated above, the approved system is also required to incorporate a two-part performance monitoring program for verifying the system's effectiveness in preventing the off-site migration of sub-surface contaminants and in removing and treating such contamination. The first part of this program, hydraulic verification, requires an eighteen well monitoring system (consisting of fourteen existing and four to-be-installed

monitoring wells) to verify that groundwater at the eastern and southern boundaries of the facility is flowing toward the recovery wells and not off-site. 1983 Engineering Report at 17-18 (Exhibit 8); December 16, 1983 Moebes Letter (Exhibit 11); 1984 Final Design Plans at 12 (Exhibit 10).

31. The second part of the performance monitoring program, chemical monitoring, requires sampling and analysis of groundwater from the common header as well as from three of the eighteen wells to be used for hydraulic verification. The purpose of this program is to monitor improvements in the quality of the groundwater as the system operates[3]. 1983 Engineering Report at 20.

VI. CONSTRUCTION AND OPERATION OF THE ON-SITE SYSTEM

A. Construction Defects

32. SRSNE constructed the twenty-five extraction wells of the on-site system along the eastern and southeastern boundaries of the site between January and May of 1985[4]. Information Request Letter dated December 12, 1989 ("Information Request") at Par.

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[3] The three wells to be used for chemical monitoring are three of the four wells required to be installed for purposes of hydraulic verification. 1983 Engineering Report at 17-20 (Exhibit 8).

[4] In January, 1990, SRSNE replaced three of the original 25 recovery wells of the on-site system. However, EPA did not formally approve the installation of these new wells because SRSNE installed the wells on a test basis rather than submitting the "modified engineering design specifications as shall be necessary to meet the projected influence" required by Par. 8(G) of the Consent Decree. Letter of November 7, 1989 from EPA to SRSNE (Exhibit 12).

1.b (Exhibit 13); Information Request Response dated January 16, 1990 and January 18, 1990 from SRSNE to EPA at Par. 1.b ("Information Request Response") (Exhibit 14). The wells and pumps are located inside four foot diameter manholes, also known as well access chambers, which vary from four feet to eight feet in depth below ground surface.

33. On December 13, 1985, SRSNE received its National Pollution Discharge Elimination System (NPDES) Permit from the State of Connecticut for the operation of the groundwater recovery system. NPDES Permit (Exhibit 15). The on-site system began operating four days later on December 17, 1985. Letter of January 10, 1986 from SRSNE to EPA ("January 10, 1986 Boiler Room Fire Letter") at 3 (Exhibit 16).

34. The system as constructed by SRSNE failed to conform to the 1983 Engineering Report and the 1984 Final Design Plans in the following respects.

(i) Inadequate Well Depth and Aquifer Penetration

35. SRSNE proposed two criteria for construction of the on-site system extraction wells in the 1983 Engineering Report and 1984 Final Design Plans. The first criterion specifies that well points (the lowest point of each well) would be about 25 feet deep and would penetrate three feet of the underlying bedrock. 1983 Engineering Report at 10 (Exhibit 8); 1984 Final Design Plans at 11 (Exhibit 10). The second and most important criterion specifies the amount of drawdown necessary at each well

in order to meet the projected cone of influence[5]. 1983 Engineering Report at 12 (Exhibit 8); 1984 Final Design Plans at 11 at Figure 3 (Exhibit 10).

36. Rather than installing all of the extraction wells to about twenty-five feet below ground surface, the wells were installed at a range of depths from a minimum of 15.75 feet (Well 19) to a maximum of 26.92 feet (Well 4).[6] Well Construction Elevations (Exhibit 17); Map PZ-1 (Exhibit 18). The average well depth is 21.3 feet below the tops of the well access chambers. Further, for 13 of the 25 wells, SRSNE did not install the well points three feet into bedrock. Well Construction Elevations (Exhibit 17). The wells that were not installed three feet into bedrock are shown below[7]:

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[5] Drawdowns at the extraction wells were required to range from 7.74 feet to 5.17 feet. 1983 Engineering Report at 5 (Exhibit 8).

[6] The depths of these wells were calculated by subtracting the well point elevations listed in the Well Construction Elevations provided by SRSNE to EPA in January, 1990 ("Well Construction Elevations")(Exhibit 17) from the well access cover elevations listed on Map PZ-1 provided by SRSNE to EPA in January, 1990 ("Map PZ-1")(Exhibit 18). Exhibits 17 and 18 were provided to EPA in the Information Request Response (Exhibit 14).

[7] The figures for feet of penetration into bedrock were calculated by subtracting the elevations of well points from the elevations of bedrock shown in Exhibit 17.

Well Number	Feet of Penetration into bedrock	Well Number	Feet of Penetration into bedrock
5	2.0	12	2.58
6	2.83	13	2.92
7	2.83	17	2.92
8	2.75	19	2.25
9	2.92	20	2.75
10	2.83	24	2.92
11	2.75		

37. Extraction Wells 1, 2 and 19 were not constructed so that they penetrated enough of the saturated thickness of the aquifer to meet the projected drawdown once the system began operating. As a result, the individual projected cones of influence for these wells could not possibly have been met. This conclusion is based upon a comparison of measurements taken by SRSNE for each of these wells and the amount of drawdown projected by the 1983 Engineering Report for these wells. Information Request Response at Par. 1.p (Exhibit 14); Baseline Gauge Readings taken by SRSNE as an average of three readings on January 9, 10, and 13, 1986 ("Baseline Gauge Readings")(Exhibit 19)[8]; 1983 Engineering Report at 12 (Exhibit 8).

38. Well Number 1: SRSNE's Baseline Gauge Reading for Well 1 is zero, which means that no measurable water existed in the well in January, 1986. Baseline Gauge Readings (Exhibit 19). Similarly, in reports submitted by SRSNE as hydraulic verification reports, either no water existed in Well 1 before

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[8] The Baseline Gauge Readings (Exhibit 19) were provided to EPA in January 1990 by SRSNE as Attachment 5 to the Information Request Response (Exhibit 14).

August 20, 1986 or the gauge for the well was broken. Letter dated March 13, 1986 from SRSNE to EPA ("March 13, 1986 Report") at Tables 2 and 3 (Exhibit 20); Letter dated May 15, 1986 from SRSNE to EPA ("May 15, 1986 Report") at attached table (Exhibit 21); Letter dated November 20, 1986 from SRSNE to EPA ("November 20, 1986 Report") at Table 1 (Exhibit 22); Letter dated June 5, 1987 from SRSNE to EPA ("June 5, 1987 Report") at Table 1 (Exhibit 23); Letter dated October 23, 1987 from SRSNE to EPA ("October 23, 1987 Report") at Table 1 (Exhibit 24)[9]. Thus, it is unlikely that Well 1 ever intersected the aquifer when the system was operating, much less that it intersected enough of the aquifer to achieve the 5.17 feet of drawdown required by the 1983 Engineering Report. 1983 Engineering Report at 12 (Exhibit 8).

39. Well Number 2: Well 2 did not contain water at the time it was constructed. Information Request Response at Pars. 1.r and 1.s (Exhibit 14); SRS Well Yields (Exhibit 26)[10]. Furthermore, SRSNE's Baseline Gauge Reading for Well 2 is zero, which means that no measurable water existed in the well in January, 1986. Baseline Gauge Readings (Exhibit 19). No

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[9] The gauge attached to the well is either the vacuum gauge or the water level gauge. 1984 Final Design Plans at Figure 3 (Exhibit 10). The November 20, 1986 Report indicates that a gauge for Well 1 was broken between July 14, 1986 and August 20, 1986. Subsequent reports submitted to EPA which SRSNE claims to be hydraulic verification reports indicate that the gauge remained broken until at least September 25, 1987. November 20, 1986 Report (Exhibit 22); June 5, 1987 Report (Exhibit 23); October 23, 1987 Report (Exhibit 24).

[10] "SRS Well Yields" (Exhibit 26) were provided to EPA in January 1990 as Attachment 9 to the Information Request Response (Exhibit 14).

evidence exists showing that drawdown of groundwater has ever been measured from this well.

40. Well Number 19: Well 19 penetrated only 5.5 feet of the aquifer in January, 1986. Baseline Gauge Readings (Exhibit 19). Therefore, this well could not have achieved its required 7.74 feet of drawdown at the time the system was re-started in January, 1986. 1983 Engineering Report at 12 (Exhibit 8).

(ii) Inadequate Well Yield

41. In order for a pumping well to establish and maintain a cone of influence in an aquifer, a certain amount of water must be able to enter the well over a given period of time. The rate that water enters a well from the surrounding aquifer is dependent on certain factors, including the properties of the aquifer, well construction, and pump specifications. The hydrogeologic concept applicable here is known as "well yield" which is the maximum pumping rate that can be supplied by a well without lowering the water level in the well below the pump intake[11]. Freeze and Cherry, Groundwater, 1979, at 305 (Exhibit 25).

42. The minimum pumping rate necessary to establish and maintain the projected influence for the on-site system is 10,800 gallons per day, or 0.3 gallons per minute (gpm) from each

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[11] The pump intake for the on-site system recovery wells is the bottom of a 3/4" diameter pipe located inside the well casing. This internal pipe, also known as the "drop tube" or "drop pipe," draws water from the bottom of the well and delivers it to the piping systems that lead to the water pump. 1984 Final Design Plans at Figure 2 (Exhibit 10).

individual well point. 1983 Engineering Report at 10 (Exhibit 8). Furthermore, if necessary, each well should be able to triple its pumping rate to approximately 1 gpm. 1983 Engineering Report at 14 (Exhibit 8).

43. Seven of the 25 on-site recovery wells did not reach the minimum .3 gpm pumping rate and twelve of the 25 wells did not reach the maximum 1 gpm pumping rate. Information Request Response at Pars. 1.r and 1.s (Exhibit 14); SRS Well Yields (Exhibit 26). The deficient wells and their corresponding well yields are listed below (as converted to gallons per minute or gpm). An asterisk (*) indicates wells that did not meet even the minimum requirement.

Well Number	Yield (gpm)
*1	.03
*2	0.0
4	.5
6	.75
*9	.25
10	.75
*11	.25
*13	.25
14	.75
~~15~~ 16	.38
*17	.13
*18	.13

44. By at least June of 1985, SRSNE had information showing that the low yields from these 12 wells would prevent performance in accordance with the 1983 Engineering Report. Such deficiencies should have signalled to SRSNE that the system was unlikely to attain its projected cone of influence.

(iii) Inappropriate Screen Slot Size

45. SRSNE was responsible for selection of the proper size slots in the well screens of the on-site extraction wells. 1984 Final Design Plans at 11 (Exhibit 10).

46. The slot size of a well screen should be both small enough to retain larger size aquifer materials[12] outside the well screen and large enough to prevent clogging by finer materials present in the aquifer. Standard practice is to select a slot size large enough to allow about 60% of the aquifer materials to pass through the screen when the well is developed. Evaluation of Grain Size Analysis and Slot Size at 1 ("Slot Size Analysis")(Exhibit 27). Therefore, the slot size must be selected only after gaining a thorough understanding of the range and distribution of aquifer material grain sizes. This understanding usually requires the collection of samples for analysis of grain size distribution.

47. SRSNE did not attempt to characterize the grain size distribution of aquifer materials until April, 1989, approximately 3 years and 11 months after selecting and installing the wells. Information Request Response at Pars. 1.i, 1.k and 1.m (Exhibit 14); Letter of February 16, 1989 from R.

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[12] Aquifer materials as used here refers to grains or particles of rocks (e.g. silt, sand or gravel, etc.) that exist below the water table.

Drake to J. Hulm (Exhibit 28)[13]. Characterization of the grain size distribution revealed that an average of only about 20% of the aquifer materials would pass through the original well screens. Slot Size Analysis (Exhibit 27).

48. After failing to characterize grain size distribution prior to selecting the slot size for the well screens, SRSNE chose a grossly inadequate screen slot size (.006 inch) for the wells. Information Request Response at Pars. 1.n and 1.o (Exhibit 14). This choice resulted in the clogging of two of the well screens and is likely to have resulted in the clogging of additional well screens. January 8, 1990 Photographs by M. Hoagland (Exhibit 29). The clogging of well screens in all likelihood contributed to the failure of the clogged wells to achieve their design pumping rates and thus to the overall failure of the system to meet its projected cone of influence.

(iv) Incorrect Grouping of Wells to Pumps

49. Wells of similar yields were required to be piped to a common pump. 1984 Final Design Plans at 11 and 13 (Exhibit 10). The purpose of this requirement is to minimize the need for adjustments to wells and pumps in a demonstrably dynamic aquifer system.

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[13] SRSNE provided EPA "Gradation Analysis and Wet Sieve Tests" as an attachment to the February 16, 1989 letter from R. Drake to J. Hulm (Exhibit 28) in January, 1990 as part of the Information Request Response. The "Gradation Analysis and Wet Sieve Tests" data are provided together with the Slot Size Analysis (Exhibit 27).

50. SRSNE chose to combine extraction wells in groups of five according to their proximity to each other rather than according to the similarity of their yields. The as-built groupings consist of the following arrangement:

Well Numbers	Access Chamber no. for pump
1-5	3
6-10	6
11-15	13
16-20	18
20-25	23

51. The requirement that SRSNE group wells according to similar yield was clearly not adhered to. For example, the yields per minute for Wells 1 through 5 read as follows when converted to gallons per minute (gpm). SRS Well Yields (Exhibit 26).

Well Number	Yield gpm
1	0.03
2	0
3	9
4	0.5
5	3

52. Thus, the pump which serves Wells 1 through 5 is connected to the two lowest yielding wells of the entire system (Wells 1 and 2) and the highest yielding well of the entire system (Well 3). SRS Well Yields (Exhibit 26).

53. The requirement of grouping wells by yield was also violated at Wells 16 through 20 and at Wells 21 through 25. Wells 16 through 20 combine two low yielding wells of .125 gpm (Wells 17 and 18) with a high yielding well of 4 gpm (Well 20).

Wells 21 through 25 combine two low yielding wells of 2 and 3 gpm (Wells 22 and 25, respectively) with three high yielding wells of 8 gpm (Wells 21, 23 and 24).

54. In practice, the grouping of extraction wells of the on-site system by proximity rather than by similar yield caused SRSNE to have considerable difficulty maintaining operations of pumps and hence, establishing the projected cone of influence. Information Request Response at Par. 10 (Exhibit 14); Letter of October 17, 1988 from YWC to EPA ("October 17, 1988 Warner Letter") (Exhibit 30). It is highly unlikely that SRSNE could have established the projected cone of influence in light of this difficulty maintaining operation of pumps.

(v) Failure to Install Failsafe Devices

55. When it began operating the on-site system in December, 1985, SRSNE had failed to install two failsafe components required by the 1983 Engineering Report. These components are: 1) automatic shut down devices to protect pumps from damage; and 2) alarms to notify operators of pump problems when such a shutdown occurs.

56. The automatic shut down devices and alarms were to operate in the following manner:

> In the event the pumps lose their prime by the entrance of air into the suction header (caused by either one or more wells being pumped dry or an inadvertent air leak in the system), the pump(s) will automatically shut down to avoid damage to the system. A local alarm will be activated to alert the operator to the problem for subsequent repair by SRSNE or a well system contractor.

1983 Engineering Report at 15 (Exhibit 8).

57. SRSNE's failure to install the alarms and automatic shut down devices has contributed to a situation in which the breakdown of pumps is commonplace and the shut down time of pumps is unnecessarily lengthy.

B. Operational Defects

58. Water level measurements collected by SRSNE from the hydraulic verification wells have clearly indicated that the projected cone of influence was never achieved on any day when measurements were taken from these wells. An evaluation of these measurements is provided later in this Declaration in the section entitled "Hydraulic Verification Reports." This section on operational defects lists some of the major reasons for the failure of the on-site system to meet the projected cone of influence.

(i) Discontinuous Operation

59. The on-site system is required to be operated continuously such that each pump delivers a steady flow of groundwater from the wells. 1984 Final Design Plans at 14 (Exhibit 10). As the following paragraphs illustrate, during much of the period of required operation, the on-site system did not operate such that each pump delivered a steady flow of groundwater from the wells. It is extremely unlikely that SRSNE could have established the projected cone of influence without utilizing operation of all five pumps to deliver a continuous flow of groundwater.

60. Period of Required Operation: SRSNE started up the on-site system on December 17, 1985. On December 27, 1985, the system was shut down due to a fire in the boiler room of the operations building. January 10, 1986 Boiler Room Fire letter (Exhibit 16). On January 13, 1986, the system was restarted. February 3, 1986 Report (Exhibit 31). Prior to 1990, the required period of continuous operation was therefore 1458 days (10 days from December 17, 1985 to December 27, 1985, and 1448 days from January 13, 1986 to December 31, 1989).

61. Period of Record: The "Period of Record" referred to in this Declaration consists of the period of time prior to 1990 through which pump operation logs were provided by SRSNE to EPA on January 16, 1990[14]. Information Request Response at Par. 9 (Exhibit 14); Shallow Well Operation Logs ("1986 Pump Operation Logs") (Exhibit 32); 1987 Daily NPDES Monitoring Logs ("1987 Pump Operation Logs")(Exhibit 33)[15]; 1988 Daily NPDES Monitoring Logs ("1988 Pump Operation Logs") (Exhibit 34); 1989 Daily NPDES Monitoring Logs ("1989 Pump Operation Logs") (Exhibit 35).

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[14] Pump operation logs were provided to EPA by SRSNE as Attachment 24 to the January 16, 1990 Information Request Response.

[15] The pump operations logs are separated in this Declaration by year. In the January 16, 1990 Information Request Response, SRSNE submitted two different types of pump operation logs for year 1987. Upon close inspection of these logs, I determined that some of these pump operation logs were for 1986 and that no pump operation logs were submitted by SRSNE for the period August 11, 1986 to August 4, 1987. 1986 Pump Operation Logs (Exhibit 32); 1987 Pump Operation Logs (Exhibit 33).

62. The Period of Record includes 161 days of record between February, 1986 and August, 1986, 143 days between August, 1987 and December, 1987, 363 days in 1988 and 336 days in 1989. The Period of Record is a total of 1003 days of the 1458 required days of operation prior to 1990. 1986 Pump Operation Logs (Exhibit 32); 1987 Pump Operation Logs (Exhibit 33); 1988 Pump Operation Logs (Exhibit 34); 1989 Pump Operation Logs (Exhibit 35).

63. Extent of Discontinuous Operation: The results of my review of the on-site system pump operation logs are presented in Attachments A and B to this Declaration. Pump Number 3 was not operating for 652 days, or 65% of the period of record; Pump Number 23 was not operating for 546 days, or 54% of the period of record; and Pump Number 13 was not operating for 354 days, or 35% of the period of record (Attachment A). 1986 Pump Operation Logs (Exhibit 32); 1987 Pump Operation Logs (Exhibit 33); 1988 Pump Operation Logs (Exhibit 34); 1989 Pump Operation Logs (Exhibit 35).

64. At least one pump was not operating for 952 days, or 95% of the period of record, and at least two pumps were not operating for 421 days, or 42% of the period of record. Exactly one pump was not operating for 522 days or 52% of the period of record. For 205 days, or 20% of the period of record, exactly two pumps were not operating. Also, at least three pumps were not operating for 216 days or 22% of the period of record (Attachment B). 1986 Pump Operation Logs (Exhibit 32); 1987 Pump

Operation Logs (Exhibit 33); 1988 Pump Operation Logs (Exhibit 34); 1989 Pump Operation Logs (Exhibit 35).

65. Wells 1 through 5 did not operate from January 1, 1990 until at least April 27, 1990. 1990 Daily NPDES Monitoring Logs ("1990 Pump Operation Logs") (Exhibit 36).

(ii) Repair or Replacement of Pumps

66. In several instances, SRSNE allowed an excessive length of time to elapse before it replaced broken pumps. As noted above, each pump is connected to five wells. Therefore, the breakdown of a pump results in the inoperation of 20% of the on-site system, and is likely to allow significant quantities of subsurface contaminants to continue to migrate off-site from the SRSNE facility.

67. Pump Number 3: The pump in Well Access Chamber No. 3 was off from July 10, 1988 to July 17, 1988, and from July 25, 1988 until at least April 27, 1990, or a total of at least 21 months. 1988 Pump Operations Logs at 7/10 to 12/31, (Exhibit 34); 1989 Pump Operation Logs (Exhibit 35); 1990 Pump Operation Logs (Exhibit 36).

68. Pump Number 13: On March 20, 1988, Pump Number 13 had burned itself out. Although the pump was replaced over three months later on June 24, 1988, nearly five and a half more months transpired before that pump was put into operation on December 7, 1988. 1988 Pump Operations Logs at 3/20 to 12/7 (Exhibit 34).

69. Pump Number 13 again broke down on October 3, 1989 and was not replaced and operating until December 15, 1989. 1989 Pump Operations Logs at 10/3 to 12/15 (Exhibit 35).

70. Pump Number 23: Pump Number 23 was inoperative from August 12, 1989 to September 8, 1989. 1989 Pump Operations Logs at 8/12 to 9/8 (Exhibit 35).

71. Pump Number 23 broke down again on October 14, 1989 and was replaced on December 12, 1989, nearly two months later. 1989 Pump Operations Logs at 10/14 to 12/12 (Exhibit 35).

(iii) Minimum Pumping Rate

72. As stated above, the approved system was required to achieve a minimum pumping rate of .3 gallons per minute (gpm) from each well and a cumulative pumping rate of 10,800 gallons per day (gpd) from the entire system and, if necessary, 1 gpm from each well and a cumulative pumping rate of 36,000 gpd. 1983 Engineering Report at 10 and 14 (Exhibit 8).

73. Tabulated below are the daily discharges averaged for the years 1986 through 1989 as compiled from reports submitted by SRSNE as part of its NPDES permit requirements. The reported flow rates on the basis of which these averages were calculated are listed in Attachment C to this Declaration. As the table below shows, only in 1986 did SRSNE meet the minimum required pumping rate for the on-site system.

Year	Average discharge rate (gpd)
1986	12,877
1987	9,859
1988	3,679
1989	9,535

(iv) Flooding of Access Chambers

74. The on-site system pumps are very vulnerable to damage from flooding. Consequently, the manufacturer states that the pumps should be placed in dry areas that are well above wet floors. Installation, Operating and Maintenance Instructions for Burks Turbine Pumps at 3 (Exhibit 37).

75. Below are several examples of how the well access chambers which house these pumps are not constructed so as to prevent stormwater, including meltwater from snow, from entering and pooling within the well access chambers. This water is responsible for considerable damage to the pumps and resulting periods of inoperation of those pumps. In addition, the pooled water hampers the ability of maintenance personnel at SRSNE to routinely inspect or perform operation and maintenance activities on the pumps and wells.

76. Between October 3, 1989 and December 15, 1989, Pump 13 was shut down. The pump operation logs indicate that water is the likely cause for this breakdown. 1989 Pump Operation Logs at 10/3 (Exhibit 35). On December 12, 1989, Pump 13 was coated with silt from being immersed in water. December 12, 1989 Photograph by M. Hoagland (Exhibit 38).

77. On or before January 8, 1990, SRSNE allowed snow to be plowed from the facility driveways onto the well access chambers. This snow would in all likelihood subsequently melt and create further flooding problems. January 8, 1990 Photographs by M. Hoagland (Exhibit 39).

78. In July, 1988 and again in October, 1988 a hydrogeology consultant for SRSNE reported to SRSNE that the consultant's services were hampered by flooding of the well access chambers. Memorandum dated July 14, 1988 from James Hall to Brian Armet (Exhibit 40); October 17, 1988 Warner Letter at Attachment (Exhibit 30).

VII. HYDRAULIC VERIFICATION

A. Purpose of Hydraulic Verification

79. The initial designs of extraction systems for removal of contaminated groundwater are often imperfect due to incomplete hydrogeological data at the time of design. As a result, the need for modifications (such as adjusting pumping rates, changing pumps or installing additional wells) becomes apparent once a system has operated.

80. The purpose of the hydraulic verification reports required by Par. 8(E) of the Consent Decree is to demonstrate whether or not the system is meeting its objective of preventing off-site migration of subsurface contaminants and extending its influence off-site to the maximum extent practicable. These

reports should also serve to point out what modifications to the system are necessary once the system has begun operation.

B. Construction of Monitoring Wells

81. The hydraulic verification system approved by EPA requires the use of 18 monitoring wells, also known as verification wells. 1983 Engineering Report at 17 (Exhibit 8); 1984 Final Design Plans at 12 (Exhibit 10). Four of these 18 wells needed to be installed and surveyed for location and elevation by SRSNE after approval of the 1984 Final Design Plans and prior to the startup of the on-site system. These four wells were to be located on properties adjoining the SRSNE site. SRSNE had from December, 1983, when EPA notified SRSNE of approval of the 1983 Engineering Report until December, 1985, or approximately two years, to work out agreements with the adjoining property owners for access to install these four monitoring wells prior to starting up the system. December 16, 1983 Moebes Letter (Exhibit 9); January 10, 1986 Boiler Room Fire letter (Exhibit 16).

82. SRSNE took nearly three years from the time the on-site system commenced operation to install all of the required monitoring wells, and over four and a half years from the time that SRSNE knew that such wells had to be installed as part of the on-site system.

83. The installation dates of the four wells are shown in the table below, along with the number of months that such installations occurred after the on-site system started up and

the number of months that such installations occurred after SRSNE first knew that it had to obtain access agreements from adjoining property owners. Letter dated February 17, 1989 from SRSNE to EPA ("February 17, 1989 Notification of Monitoring Well Installation") (Exhibit 41)[16]:

Well	Installation Date	Months since Start Up	Months since Approval
DN-3	Dec. 6, 1986	12	36
DN-1	Sep. 9, 1988	32	56
DN-2	Sep. 10, 1988	32	56
HP-1	Sep. 9, 1988	32	56

C. Mapping of Wells for Performance Reports

84. The cone of influence of the on-site system must be portrayed by SRSNE on a groundwater contour map in each hydraulic verification report. Consent Decree at Par. 8(E) (Exhibit 2); 1983 Engineering Report at 19 (Exhibit 8). In preparation for construction of the groundwater contour maps, SRSNE should have accurately mapped prior to start up of the on-site system all of the 18 hydraulic verification wells and all of the 25 extraction wells and recorded the elevations of each well's measuring point. However, the mapping of hydraulic verification wells was not completed until January 29, 1990, when the elevation of well DN-3

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[16] Although the dates of installation of these wells are listed here, it should be noted that the period of time during which such wells could have been useful for purposes of hydraulic verification did not begin until the elevations of such wells were surveyed. For example, well DN-3, the first of the four hydraulic verification wells to be installed, was not surveyed until January 29, 1990. February 22, 1990 Report (Exhibit 42). This point is discussed in further detail below.

was surveyed. Letter dated February 22, 1990 from SRSNE to EPA at Table 1 ("February 22, 1990 Report")(Exhibit 42).

85. SRSNE submitted a map in January, 1990 in response to EPA's request for the "as-built" locations of the hydraulic verification wells. Information Request Response at 7 (Exhibit 14); Information Request at Par. 2 (Exhibit 13). However, rather than submitting a map which portrayed the actual locations of the hydraulic verification wells, SRSNE merely submitted a copy of Figure 3 from Appendix B of the 1983 Engineering Report[17]. This map portrays only the proposed locations of the hydraulic verification wells; furthermore, EPA had notified SRSNE of well location errors in this map as early as 1984. December 20, 1984 Moebes letter (Exhibit 11). This submittal indicates that as of early January, 1990, SRSNE had still not mapped the hydraulic verification wells, thus preventing the production of a groundwater contour map.

D. Hydraulic Performance Reporting

(i) Timeliness of Reports

86. The first hydraulic verification report was required to include daily measurements for the first week of operation of the on-site system and the second, third and fourth reports were required to include weekly measurements for the first three months of operation of the system. Subsequent reports were to be

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[17] Appendix B of the Engineering Report is the version of the Final Design Plans prior to their revision in November, 1984.

submitted on a quarterly basis. Consent Decree at Par. 8(E) (Exhibit 2).

87. Attachment D to this Declaration tabulates the required submittal dates for the hydraulic verification reports and the dates that reports which SRSNE claimed to be hydraulic verification reports were submitted. Attachment D is premised upon an acceptance of SRSNE's proposal to submit reports at the end of each month. February 3, 1986 Report (Exhibit 31).

88. As Attachment D shows, SRSNE failed to adhere to the reporting schedule required by the Consent Decree, as modified by the above-referenced SRSNE proposal. Although SRSNE was required by the Consent Decree to have submitted 19 hydraulic verification reports prior to 1990, SRSNE submitted only six reports which the company claimed to be hydraulic verification reports. None of these Pre-1990 Reports[18] was submitted on its due date.

89. SRSNE did not collect any water level measurements for purposes of hydraulic verification for a greater than two year period from December, 1987 to January 16, 1990. Information Request Response at Par. 4 (Exhibit 14).

(ii) Adequacy and Results of Reports

90. The format for the Hydraulic Performance Reports is set out in the 1983 Engineering Report at 19 (Exhibit 8) as follows:

> The reporting format for each submission will include a summary table of all water level measurements collected since the previous report and an updated groundwater contour

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[18] The six reports that SRSNE claims to be hydraulic verification reports are grouped together in this Declaration as the "Pre-1990 Reports."

map based on a synoptic set of water level measurements collected during the reporting period. The generation of an updated contour map will illustrate the ongoing maintenance of the recovery system cone of depression.[19]

91. Pre-1990 Reports: As stated above, SRSNE submitted six reports to EPA prior to 1990 which SRSNE claims to be hydraulic verification reports. The first hydraulic verification report contains water level data from two of the required eighteen monitoring wells, WE-5 and TW-8A. February 3, 1986 Report (Exhibit 31). Four of the subsequent five hydraulic verification reports contain water level data from the 25 recovery wells and from the same two monitoring wells, WE-5 and TW-8A. March 13, 1986 Report (Exhibit 20); May 15, 1986 Report (Exhibit 21); June 5, 1987 Report (Exhibit 23); October 23, 1987 Report (Exhibit 24). The report submitted to EPA on November 20, 1986 contains water level measurements only from the recovery wells. November 20, 1986 Report (Exhibit 22).

92. SRSNE neither prepared nor submitted groundwater contour maps for the on-site system prior to 1990. Information Request Response at Par. 6 (Exhibit 14). Furthermore, the data submitted by SRSNE was both incomplete and inadequate for EPA to construct such maps. Of major concern is the fact that SRSNE's groundwater data as reported is in relation to "Baseline" measurements rather than in relation to a known datum (such as mean sea level). The use of "Baseline" measurements does not

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[19] "Cone of depression" is another term for "cone of influence," which is defined in paragraph 8(B) of the CD, as explained in footnote 1, above.

allow reviewers to evaluate how the drawdown from recovery wells relates to natural seasonal fluctuations in the water table. Thus the Pre-1990 Reports are not useful for determining where and to what extent modifications were or are necessary to meet the projected cone of influence.

93. The proper operation of the recovery wells and the resulting establishment of the projected cone of influence should result in a reduction of the water table surface such that the water table elevation in well WE-5 is six feet less than the water table elevation in well TW-8A[20]. 1984 Final Design Plans at Figure 3 (Exhibit 10). The Pre-1990 Reports and one additional report[21] provide (in relation to "baseline" measurements) 49 reliable water level readings in wells WE-5 and TW-8A from February 1986 to September 1987. When this data is corrected so that the water table information is presented in relation to the datum of feet above mean sea level (rather than in relation to "baseline"), it is clear that the water table at well WE-5 has never been six feet below the water table at well TW-8A on a day when measurements were taken. In fact, on many

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[20] Under natural (non-pumping) conditions, the water table in well WE-5 would be approximately 1 foot higher than the water table elevation in well TW-8A. Evaluation of Water Table Elevations for Wells WE-5 and TW-8A from Pre-1990 Hydraulic Verification Reports by M. Hoagland dated June 24, 1990 ("WE-5 and TW-8A Water Elevation Analysis") at 2 (Exhibit 45).

[21] This additional report refers to a letter dated November 14, 1986 from YWC, SRSNE's consultant, to SRSNE. Letter of November 4, 1986 from YWC to SRSNE ("November 14, 1986 Report") (Exhibit 44). The water level data contained in this letter report was provided to EPA in the Information Request Response (Exhibit 14), but not in any of the Pre-1990 Reports.

occasions, the water table was actually higher at well WE-5[22]. Therefore, the projected cone of influence was not being achieved at any time when water level measurements were being collected from wells WE-5 and TW-8A for the Pre-1990 Reports and the November 4, 1986 Report. November 4, 1986 Report (Exhibit 44); WE-5 and TW-8A Water Elevation Analysis (Exhibit 45).

94. February 22, 1990 Report: The first report in the greater than four year history of operation of the on-site system to provide water elevation data from all 18 hydraulic verification wells and a groundwater contour map was submitted by SRSNE to EPA in February, 1990. Letter of February 22, 1990 ("February 22, 1990 Report") (Exhibit 42). However, no elevation data is provided for the 25 recovery wells, other than for Wells 12, 15 and 21, the newly replaced wells[23]. As a result, the February 22, 1990 Report does not include data, nor does the contour map portray information, regarding the northernmost and southernmost portions of the site. By not addressing the hydraulic performance of the entire 25 recovery wells, the February 22, 1990 Report does not show how the on-site system is

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[22] A higher water table elevation at well WE-5 than at well TW-8A indicates that the hydraulic gradient in the vicinity of these wells is not even in the direction of the pumping wells, as required by Par. 8(B) of the Consent Decree, let alone at an elevation in accordance with the projected cone of influence. See Footnote 1.

[23] New recovery wells were installed on January 9-10, 1990, but were not pumping on January 16-17, 1990 when water level measurements for the February 22, 1990 Hydraulic Verification Reports were taken.

"meeting or exceeding the objective and projected influence" as required by paragraph 8(E) of the Consent Decree.

95. Figure 1 of the February 22, 1990 Report shows that Wells 12, 15 and 21 have approximate drawdowns of two feet. Each of these wells was required to have 7.74 feet of drawdown. 1983 Engineering Report at 12 (Exhibit 8).

96. The February 22, 1990 Report provides further evidence that the cone of influence for the on-site system is not being met. As explained above, in order to meet the cone of influence projected by the 1983 Engineering Report and 1984 Final Design Plans, the drawdown in well WE-5 should be between 7.5 feet and 7.74 feet and the water elevation in this well should be six feet lower than the water elevation in well TW-8A. Instead, the February 22, 1990 Report shows no appreciable drawdown in well WE-5 and the water elevation in well WE-5 is .89 feet higher than that of well TW-8A. February 22, 1990 Report (Exhibit 42).

97. May 31, 1990 Report: SRSNE submitted to EPA another report in May 1990. Letter of May 31, 1990 from SRSNE to EPA ("May 31, 1990 Report")(Exhibit 43). This report also includes water elevation data from all 18 hydraulic verification wells and a groundwater contour map. Elevation data is provided for nine of the recovery wells. Three of the nine wells were actually shut off three days prior to the date of water level measurements so as to provide a comparison to the January, 1990 readings provided in the February 22, 1990 Report. May 31, 1990 Report at 2 (Exhibit 43). Drawdowns were portrayed on the contour map in

three distinct clusters rather than for the entire recovery well system. May 31, 1990 Report at attached figure (Exhibit 43). In summary, the May 31, 1990 report does not attempt to show how the on-site system is "meeting or exceeding the objective and projected influence" as required by paragraph 8(E) of the Consent Decree because: 1) the stated purpose of the May 31, 1990 report is to provide a comparison to the February 22, 1990 report (when several wells were not operating); and 2) the May 31, 1990 report does not include data, nor does the contour map portray information, regarding the entire area of projected influence of the 25 recovery wells.

98. The May 31, 1990 Report indicates localized drawdowns of approximately three feet at Wells 11 and 24 and approximately five feet at Well 18. Wells 11 and 18 are required to have 7.74 feet of drawdown and Well 24 is required to have 5.97 feet of drawdown. 1983 Engineering Report at 12 (Exhibit 8).

99. As stated above, the measured drawdown in well WE-5 should be between 7.5 feet and 7.74 feet. 1983 Engineering Report at 12 (Exhibit 8). However, the May 31, 1990 Report indicates that if any drawdown occurred in well WE-5, it was far less than the 7.5 to 7.74 feet required. May 31, 1990 Report (Exhibit 43).

100. Furthermore, the water elevation in well WE-5 is 2.38 feet higher than that of TW-8A rather than six feet lower called for by the 1984 Final Design Plans. See paragraph 93 above. May 31, 1990 Report at Table 1 (Exhibit 43). The May 31, 1990 Report

clearly indicates that the projected influence was not being met on April 30, 1990, when measurements for this report were being collected.

VIII. GROUNDWATER QUALITY MONITORING

101. The Consent Decree requires SRSNE to sample and analyze groundwater in order to monitor improvements in the water quality resulting from the operation of the on-site system. SRSNE was required to collect and analyze samples quarterly for the first year of operation and then annually until three years after the on-site system was terminated. Consent Decree at Par. 10 (Exhibit 2).

102. Samples are required to be taken from the common header of the on-site system as well as three monitoring wells located hydraulically downgradient from the on-site system. Consent Decree at Par. 10(B) (Exhibit 2). These three wells, wells DN-1, DN-2, and DN-3, should have been installed prior to startup of the on-site system in December of 1985. 1983 Engineering Report at 20 (Exhibit 8).

103. As explained above, well DN-3 was not installed until December, 1986 and wells DN-1 and DN-2 were not installed until September, 1988. February 17, 1989 Notification of Monitoring Well Installation (Exhibit 41). Despite the fact that the final monitoring well was installed in September of 1988, SRSNE did not sample and analyze groundwater from these wells until January of

1990, one year and three months later. February 22, 1990 Report (Exhibit 42).

104. The monitoring well and common header analyses indicate the presence of numerous contaminants in the groundwater underlying the SRSNE site, including trichlorethene, methyl ethyl ketone, total 1,2-dichlorethene, tetrachloroethane and 1,1,1 trichloroethane. February 22, 1990 Report (Exhibit 42). The concentrations of these compounds, significantly above levels considered by EPA to be protective of public health, indicate that the SRSNE site continues to be a significant source of groundwater contamination. Memorandum dated July 3, 1990 from J. Zipeto to M. Hoagland (Exhibit 46).

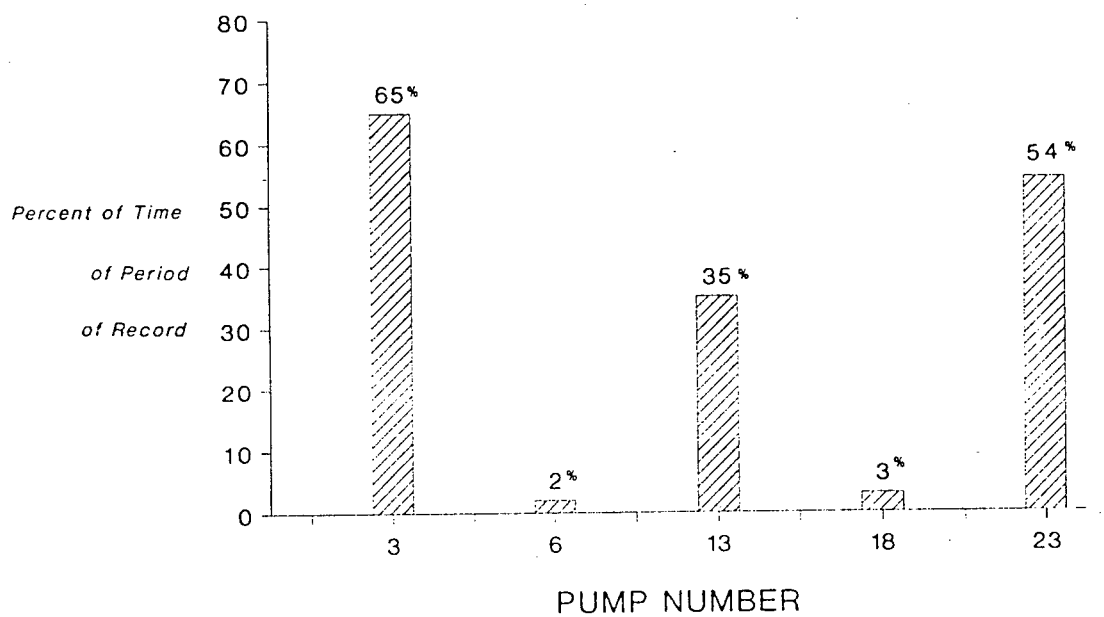
I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on July 6, 1990 at Boston, Massachusetts.

Matthew R. Hoagland

ATTACHMENT A

PERCENT OF PERIOD OF RECORD
WHEN
INDIVIDUAL PUMPS WERE NOT OPERATING

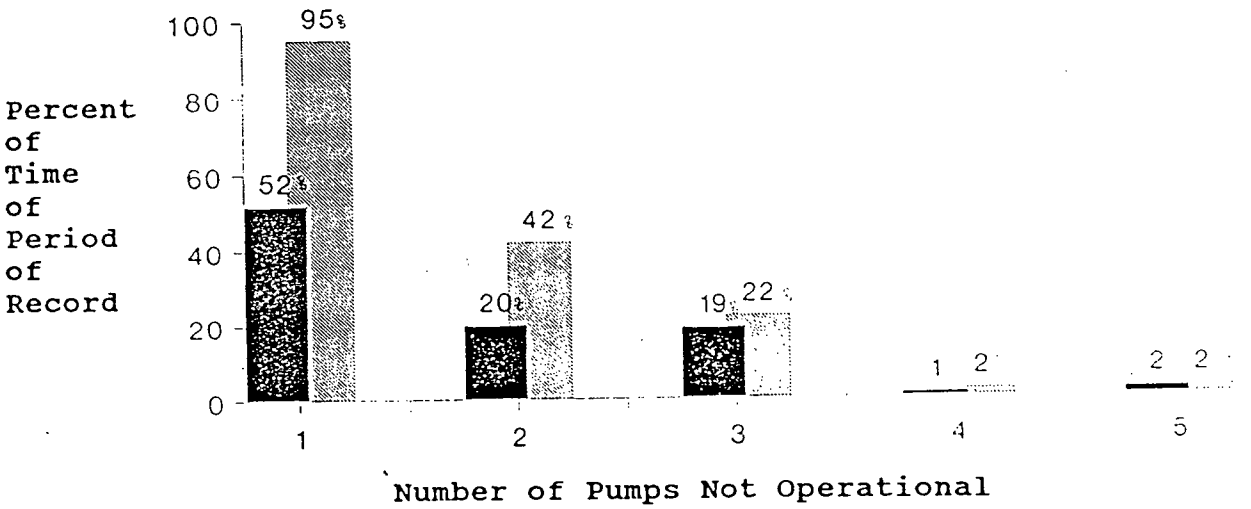


Example: Pump Number 3 (serving Wells 1-5) was not operating for 65% of the period of record, and Pump Number 23 (serving Wells 21-25) was not operating for 54% of the period of record.

The period of record consists of days prior to 1990 in which SRSNE maintained "Shallow Well Operations Logs" or "Daily NPDES Monitoring Logs" to record the operations of individual pumps. The Period of Record consists of 1003 days of 1458 days of required operation. See text for further discussion.

ATTACHMENT B

PERCENT OF PERIOD OF RECORD WHEN THE NUMBER OF PUMPS SHOWN WERE NOT OPERATING



Percent of time the number shown were not operating

Percent of time at least the number shown were not operating

Example: For 52% of the period of record, one of the five pumps was not operating and for 95% of the period of record, at least one pump was not operating.

The period of record consists of days prior to 1990 in which SRSNE maintained "Shallow Well Operations Logs" or "Daily NPDES Monitoring Logs" to record the operations of individual pumps. The Period of Record consists of 1003 days of 1458 days of required operation. See text for further discussion.

ATTACHMENT C

On-site system flow rates from SRSNE's Discharge Monitoring Reports.

DATE	FLOW RATE (gpd)
07/22/87	7412
08/05/87	4210
08/19/87	4210
09/02/87	5170
09/16/87	5170
09/29/87	5170
10/14/87	6021
10/28/87	6021
11/18/87	6714
12/02/87	2771
12/16/87	2771
12/30/87	2771
01/13/88	2960
01/27/88	2960
02/17/88	5286
02/24/88	5286
03/09/88	6124
03/23/88	3567
04/06/88	4652
04/27/88	4652
05/04/88	3491
05/18/88	3491
06/01/88	3301
07/01/88	3007
07/13/88	2780
07/27/88	3824
08/10/88	3542
08/24/88	2686
09/07/88	2448
09/21/88	2101
10/06/88	1338
10/26/88	1398
11/08/88	2281
11/16/88	2538
11/30/88	3103
12/14/88	9797
12/28/88	5349
01/11/89	7378
01/25/89	7575
02/08/89	6337
02/22/89	3364

DATE	FLOW RATE (gpd)
01/17/86	2400
01/22/86	2400
02/05/86	4500
02/19/86	8000
03/05/86	14400
03/19/86	30200
04/02/86	32000
04/16/86	30400
04/30/86	30200
05/14/86	29400
05/28/86	13377
06/11/86	13800
06/25/86	11400
07/09/86	11288
07/23/86	11288
08/06/86	12900
08/20/86	7609
09/03/86	9260
09/17/86	7200
10/01/86	5590
10/15/86	4470
10/29/86	4550
11/12/86	6650
11/25/86	10785
12/10/86	14185
12/23/86	6550
01/07/87	14000
01/21/87	14000
02/04/87	14000
02/18/87	14000
03/04/87	15850
03/18/87	15850
04/01/87	13800
04/15/87	13800
04/29/87	13800
05/13/87	16700
05/27/87	16700
06/10/87	14000
06/24/87	14000
07/08/87	7412

DATE	FLOW RATE (gpd)
03/08/89	4056
03/22/89	3004
04/04/89	6438
04/18/89	10904
05/02/89	10062
05/16/89	15498
06/01/89	15978
06/19/89	14533
07/06/89	13210
07/18/89	14076
08/01/89	12357
08/14/89	10913
09/05/89	10131
09/19/89	11386
10/03/89	11973
10/17/89	8150
10/24/89	7636
10/31/89	7349
11/15/89	6997

ATTACHMENT D

Hydraulic Verification Reporting Periods and Due Dates

Report Number	Required Reporting Period	Due Date for Reporting Period	Date Report Received[1]
1	17 Dec 85-23 Dec 85	17 Jan 86	3 Feb 86
2	8 Jan 86-31 Jan 86[2]	28 Feb 86	13 Mar 86
3	1 Feb 86-28 Feb 86	31 Mar 86	
4	1 Mar 86-31 Mar 86	30 Apr 86	15 May 86
5	1 Apr 86-30 Jun 86	31 July 86	
6	1 July 86-30 Sep 86	31 Oct 86	20 Nov 86
7	1 Oct 86-31 Dec 86	31 Jan 87	
8	1 Jan 87-31 Mar 87	30 Apr 87	5 Jun 87
9	1 Apr 87-30 Jun 87	31 July 87	23 Oct 87
10	1 July 87-30 Sep 87	31 Oct 87	
11	1 Oct 87-31 Dec 87	31 Jan 88	

[1] These dates are meant only to provide a comparison to the dates when reports were due. They do not indicate that the submitted reports either covered the required reporting periods or provided the information required by the Consent Decree, the 1983 Engineering Report or the 1984 Final Design Plans. See text for further discussion of this point.

[2]Required submittal date changed to end of month based on proposal by SRSNE after Boiler Room fire. January 10, 1986 Boiler Room Fire Letter (Exhibit 16).

ATTACHMENT D

Hydraulic Verification Reporting Periods and Due Dates

Report Number	Required Reporting Period	Due Date for Reporting Period	Date Report Received
12	1 Jan 88- 31 Mar 88	30 Apr 88	
13	1 Apr 88- 30 Jun 88	31 July 88	
14	1 July 88- 30 Sep 88	31 Oct 88	
15	1 Oct 88- 31 Dec 88	31 Jan 89	
16	1 Jan 89- 31 Mar 89	30 Apr 89	
17	1 Apr 89- 30 Jun 89	31 July 89	
18	1 July 89- 30 Sep 89	31 Oct 89	
19	1 Oct 89- 31 Dec 89	31 Jan 90	
20	1 Jan 90- 31 Mar 90	30 Apr 90	22 Feb 90
21	1 Apr 90- 30 Jun 90	31 July 90	31 May 90